

Personal information

Surname(s) / First name(s)

Email(s)

Date of birth

Libralato Michele

Michele.Libralato@uniud.it

31 July 1989

Current Position

January 2022 - Ongoing

Research Fellow - Ricercatore a tempo determinato (RtdA)

at University of Udine, Italy

Il sistema edificio-impianto in una smart energy community funded by MUR (Ministero dell'Università e della Ricerca) under PON "Ricerca e Innovazione" 2014-2020 (D.M. 1062/2021) in collaboration with Archest srl. **Course:** IN1080 - Laboratorio Integrato Di Architettura Sostenibile - Mod. II - Workshop On Architectural Design And Sustainable Construction - II

Settore: ING-IND/11 - FISICA TECNICA AMBIENTALE

Corso di studi: Architettura (LM). **Activities:** The research project involves analyzing and optimizing energy integration solutions between different components of the building-plant system and between different buildings at the smart energy community level. The project is divided into three successive phases: the first involves simulating the dynamic behavior of individual buildings and their load profiles, focusing on the possibility of using storage systems for the best management of self-consumption. In the second phase, a number of real case studies will be examined to identify the logic of controlling building subsystems, load management, and self-production in relation to the demand/availability from the networks of the electric and thermal carriers. The third phase will involve comparison of model results with data obtained from monitoring energy indicators in one or more case studies.

Supervisor: Prof.ssa Paola D'Agaro.

Work Experience

October 2021 - January 2022

Adjunct Professor - Professore a Contratto

at University of Udine, Italy

Course: IN1080 - Laboratorio Integrato Di Architettura Sostenibile - Mod. II - Workshop On Architectural Design And Sustainable Construction - II

Settore: ING-IND/11 - FISICA TECNICA AMBIENTALE

Corso di studi: Architettura (LM).

April 2019 - January 2022	<p>Postdoctoral Research Fellowship - Assegno di ricerca at University of Udine, Italy</p> <p>Monitoraggio, analisi dati e modellazione di un edificio ad uso commerciale e dei suoi impianti di refrigerazione e climatizzazione funded by MIUR of Italy, within the framework of the PRIN2017 project The energy flexibility of enhanced heat pumps for the next generation of sustainable buildings (FLEXHEAT) grant 2017KAAECT</p> <p>Activities: Data collection and analysis of a commercial refrigeration and HVAC system, building modelling and simulation using TRNSYS (type development), EnergyPlus, DesignBuilder, WUFI Plus.</p> <p>Laboratory activity: Dynamic Vapour Sorption (DVS) Analyser measures of building materials at the Thermal Systems - IOT Laboratory (University of Udine)</p> <p>Supervisor: Prof. Giovanni Cortella.</p>
2017 - Ongoing	<p>Thesis Co-supervisor - Correlatore di Tesi at University of Udine, Italy</p> <p>8 dissertation theses for the civil engineering bachelor degree, 4 dissertation thesis for the civil engineering master degree and 1 dissertation thesis for the mechanical engineering master degree.</p>
November 2019 - March 2020	<p>Post-graduate research fellowship - Borsa di ricerca post-lauream at University of Udine, Italy</p> <p>Caratterizzazione dei parametri climatici critici per la valutazione del rischio di danni da umidità nei componenti edilizi</p> <p>Supervisor: Professor Onorio Saro.</p>
September 2020 - January 2021	<p>Teaching Assistant - Attività strumentale all'insegnamento at University of Udine, Italy</p> <p>Course: IN1080 - Laboratorio Integrato Di Architettura Sostenibile - Mod. II - Workshop On Architectural Design And Sustainable Construction - II</p> <p>Settore: ING-IND/11 - FISICA TECNICA AMBIENTALE</p> <p>Corso di studi: Architettura (LM).</p>
October 2017 - September 2019	<p>Student Tutor - Tutor per il corso di Ingegneria Civile at the University of Udine, Italy.</p>
November 2016 - October 2019	<p>Ph.D. Student (XXXII cycle) at the University of Udine, Italy</p> <p>Applications of Coupled Heat and Moisture Transfer Simulations in Buildings</p> <p>Supervisors: Prof. Onorio Saro and Prof. Daniele Goi.</p>

June 2019 - August 2019

Visiting Scientist

Danmarks Tekniske Universitet (Technical University of Denmark) , Kongens Lyngby, Denmark

Activities: Research on the simulation of sorption hysteresis of hygroscopic materials and moisture buffering in buildings

Supervisors: Prof. Carsten Rode and Prof. Menghao Qin.

November 2018 - March 2019

Visiting Student

at the Free University of Bozen-Bolzano, Italy

Activities: Experimental study of heat and mass transfer in novel mycelium-based building materials and opaque components of the building envelope

Supervisors: Ph.D. Giovanni Pernigotto.

June 2019 - August 2019

Industrial Trainee

Ove Arup and Partners, Glasgow, United Kingdom

Activities: Contributed to design processes and research activities concerning Façade Engineering and Building Physics, attended to training courses.

Education and Training

2016-2019

Ph.D. in Environmental and Energy Engineering Science

University of Udine, Italy

Applications of Coupled Heat and Moisture Transfer Simulations in Buildings

Supervisor: Prof. Onorio Saro **Co-supervisor:** Prof. Daniele Goi

Abstract: The uncontrolled presence of moisture in building envelopes and structures could be the cause of several typologies of damages (for example freeze-thaw cycles damage or corrosion of metal reinforcements) and health and safety hazard for the occupants (mould and fungi growth). In this thesis, the models implemented in the commercial software tools are presented and some of the limits met in the simulation process, mostly regarding material parameters and the weather files, have been studied and analysed.

2013-2016

Master of Civil Engineering

University of Udine, Udine, Italy

Qualification: 105/110

Thesis: "Condensation Risk Assessment of Shadow Box Systems in Curtain-Wall Façades"

Supervisor: Prof. Onorio Saro (Uniud) **Co-supervisor:** Ph.D. Giovanni Zemella (ARUP)

Abstract: This dissertation set out to propose a condensation risk assessment method for the shadow box curtain-wall system, a façade system used to achieve an iconic appearance in tall buildings. The shadow box complex thermal behaviour is described and discussed focusing on the performance requirements. A physical model is defined, based on radiation, natural ventilation and thermal transmission. The whole building simulation approach has been chosen over the computational fluid dynamics simulation in order to easily calibrate the model with tests and to obtain a more general model, that, once validated can be extended to a whole year simulation for a different climate and different shadow box geometries. The model is then implemented with the software EnergyPlus.

October 2014 - February 2015

Visiting student - ERASMUS Programme

Technische Universität Wien, Vienna, Austria

Completed courses: Thermal Aspects of Building Performance, Current Topics in Building Performance, Composites Engineering, Basics of Stochastic Mechanics, Finite Difference Modelling in Geoenvironmental Engineering, Stability Problems in Rock Engineering, Underground Excavation Design.

2008 - 2013

Bachelor of Civil Engineering

University of Udine, Udine, Italy

Qualification: 101/110

Thesis: "The Finite Elements Method as a Tool for The Energy-Driven Design of Window Frames"

Supervisor: Prof. Onorio Saro

Abstract: This thesis discusses the problem of the computation of the thermal transmittance of window frames with the finite elements method and shows that the obtained results can be used to design the window frames, from a thermic and hygrometric point of view. This study, based on the prescriptions of UNI EN ISO 10077-2 discusses the accuracy obtainable using different finite elements dimensions and shapes (triangular and quadrangular elements). The software used for the FEM analysis is Elmer FEM the software Gmsh is used to generate the meshes. Computational results are used to define improvements to the window frame design and to obtain better performing products. The window frame used as case study is a product of the company Serrametal S.r.l. and allows discussing the aspects of the use of the finite element method, with conclusions extendable to other building elements and other physical models.

2003 - 2008

High School graduate degree

Secondary High School Liceo Scientifico "G.Marinelli", Udine, Italy

qualification: 85/100

Books

October 2020

G.Comini, M. Libralato

Cambiamento Climatico - Il punto di vista fisico tecnico

In Italian ISBN: 888988438X (S.G.Editoriali, Padova)

Description: Testo universitario pensato come supporto per un corso sul cambiamento climatico in laurea del settore tecnico-scientifico. Vengono riassunti tutti gli argomenti principali trattati dai report IPCC, fornendo al lettore le basi di fisica tecnica che spiegano i fenomeni del cambiamento climatico.

January 2022

G.Comini, M. Libralato

Cambiamento Climatico - Il punto di vista fisico tecnico Nuova edizione

In Italian ISBN: 8833594394 (libreriauniversitaria.it)

Description: Testo universitario pensato come supporto per un corso sul cambiamento climatico in laurea del settore tecnico-scientifico. Vengono riassunti tutti gli argomenti principali trattati dai report IPCC, fornendo al lettore le basi di fisica tecnica che spiegano i fenomeni del cambiamento climatico. Nuova edizione aggiornata.

June 2022

G. Comini, M. Libralato

Verso una nuova energetica. Dalle fonti esauribili alla decarbonizzazione

In Italian ISBN: 8833594750 (libreriauniversitaria.it)

Description: Testo universitario che illustra le fonti primarie esauribili che hanno contrassegnato l'epoca industriale, ponendo l'accento sugli stimoli che hanno accompagnato le transizioni fra le diverse fonti. Successivamente sono descritte le fonti rinnovabili tradizionali e moderne nella prospettiva del loro possibile contributo alla transizione verso un sistema energetico sostenibile. Infine, sono discusse le strategie e le tecnologie necessarie per decarbonizzare il sistema energetico attuale, giustificando il ruolo prioritario che dovrà avere la generazione di energia elettrica in eccesso rispetto alle esigenze di oggi e il ruolo non secondario che dovrà essere affidato all'idrogeno.

Journal Articles

July 2023

Ciuffarin F., Négrier M., Plazzotta S., Libralato M., Calligaris S., Budtova T., Manzocco L.

Interactions of cellulose cryogels and aerogels with water and oil: Structure-function relationships

Food Hydrocolloids Vol.140(Elsevier, 2023)

October 2021

M. Libralato, A. De Angelis, G. Tornello, O. Saro, P. D'Agaro, G. Cortella

Evaluation of multiyear weather data effects on hygrothermal building energy simulations using WUFI Plus

Energies Vol. 14, Issue 21 (MDPI, 2021)

March 2021

M. Libralato, A. De Angelis, O. Saro, M. Qin, C. Rode

Effects of considering moisture hysteresis on wood decay risk simulations of building envelopes

Journal of Building Engineering 42, 102444, October 2021 (Elsevier, 2021)

June 2020

M. Libralato, A. De Angelis, G. Corazza. O. Saro

Optimization of the configuration of photovoltaic and solar thermal collectors in a nearly zero energy building

Italian Journal of Engineering Science, Vol. 64, No. 2-4, pp. 179-185., June 2020 (IIETA, 2020)

- April 2020 | M. Libralato, G. Murano, A. De Angelis, O. Saro, V. Corrado
Influence of the meteorological record length on the generation of representative weather files
 Energies, Volume 13, Issue 8, April 2020, 2103 (MDPI, 2020)
- February 2020 | K. Zu, M. Qin, C. Rode, M. Libralato
Development of a moisture buffer value model (MBM) for indoor moisture prediction
 Applied Thermal Engineering, Volume 171, 5 May 2020, 115096 (Elsevier, 2020)
- June 2019 | M. Libralato, A. De Angelis, O. Saro
Evaluation of the ground-coupled quasi-stationary heat transfer in buildings by means of an accurate and computationally efficient numerical approach and comparison with the ISO 13370 procedure
 Journal of Building Performance Simulation, 12(5):1-9, (Taylor & Francis, 2019)
- January 2019 | M. Libralato, O. Saro, A. De Angelis, S. Spinazzè
Comparison between Glaser method and Heat, Air and Moisture transient model for moisture migration in building envelopes
 Applied Mechanics and Materials 887, 385–392 (Trans Tech Publications, Ltd. 2019).
- June 2018 | A. De Angelis, M. Libralato, O. Saro
Numerical simulations of coupled conduction – free convection in low conductive vertical finned surfaces
 Modelling, Measurement and Control, 79 (3) 98-102 (IETA, 2018)

Conference Papers

- September 2021 | P. D'Agaro, M. Libralato, G. Toffoletti, G. Cortella
Ice thermal energy storage for electricity peak shaving in a commercial refrigeration/HVAC unit
 TPTPR2021 6th Thermophysical properties and Transfer Processes of Refrigerants Conference, Italy, 1- 3 September, 2021

- August 2021 | M. Libralato, A. De Angelis, P. D'Agaro, G. Cortella, M. Qin, C. Rode
Damage risk assessment of building materials with moisture hysteresis
 IBPC2021 International Building Physics Conference, Kongens Lyngby, 25-27 August 2021
- September 2019 | M. Libralato, A. De Angelis, P. D'Agaro, G. Cortella, O. Saro
Multiyear hygrothermal performance simulations of historic building envelopes
 SBE21 Sustainable Built Heritage, Bolzano, Italy, 14-16 April 2021
- September 2019 | M. Libralato, G. Murano, A. De Angelis, O. Saro, V. Corrado
Generation of moisture reference years for interstitial condensation risk assessment: influence of the meteorological record length
 16th IBPSA International Conference & Exhibition Building Simulation 2019, BS2019, Rome, Italy, 2-4 September 2019
- June 2019 | M. Danovska, M. Libralato, G. Pernigotto, A. De Angelis, O. Saro, P. Baggio, A. Gasparella
Numerical and experimental study on the impact of humidity on the thermal behavior of insulated timber walls
 Building Simulation Applications BSA 2019 - 4th IBPSA-Italy conference June, 19-21 2019, Bolzano
- June 2019 | M. Libralato, G. Pernigotto, A. Prada, A. De Angelis, O. Saro, A. Gasparella
Design and evaluation of extreme moisture reference years for moisture-related risk assessments
 Building Simulation Applications BSA 2019 - 4th IBPSA-Italy conference June, 19-21 2019, Bolzano
- September 2018 | M. Libralato, G. Murano, A. De Angelis, O. Saro, V. Corrado
Hygrothermal modelling of building enclosures: reference year design for moisture accumulation and condensation risk assessment
 7th International Building Physics Conference, IBPC2018, Syracuse, NY, USA, 23-26 September 2018

June 2018

A. De Angelis, M. Libralato, O. Saro

Numerical Simulations of Coupled Conduction – Free Convection in Low Conductive Vertical Finned Surfaces

The 3rd AIGE/IIETA International Conference and 12th AIGE 2018 Conference, Reggio Calabria – Messina, Italy, 14 – 16 June 2018

Awards

June 2019

Student paper award

Design and evaluation of extreme moisture reference years for moisture-related risk assessments

Building Simulation Applications BSA 2019 - 4th IBPSA-Italy conference June, 19-21 2019, Bolzano

Personal Skills

Mother tongue(s)

Italian

*Self-assessment
European level^(*)*

Understanding		Speaking		Writing	
Listening	Reading	Spoken interaction	Spoken production		
C2 Proficient user	C2 Proficient user	C2 Proficient user	C2 Proficient user	C2 Proficient user	C2 Proficient user
B2 Independent user	B2 Independent user	B2 Independent user	B2 Independent user	B2 Independent user	B2 Independent user

Italian

English

Interests

Building physics, Heat, air and moisture transfer in building materials, Material characterisation, Building restoration and retrofitting, Building HVAC/Refrigeration optimization, Thermal storage systems, Passive and low-tech control of indoor conditions, Communication.

^(*)Common European Framework of Reference (CEF) level

Software

Structural engineering: SAP2000

Multiphysics Elmer FEM, Comsol (UNI EN ISO 10211, UNI EN ISO 10077-2)

Hygrothermal analysis: Therm, WUFI Pro, WUFI 2D, Delphin (UNI EN ISO 13788, UNI EN 15026)

Building simulation: DesignBuilder, WUFI Plus, EnergyPlus, TRNSYS

Data analysis: Pandas (Python)

Data Visualization: Paraview, Inkscape, Matplotlib

CAD: Gmsh, AutoCAD, Rhinoceros, Archicad

Programming: Octave (Matlab), Processing (Java), C, Python, Php

Web: Wordpress, Bootstrap

Ordine degli Ingegneri

Settore: Civile

Posizione: A-3611

sez. Udine

Data iscrizione: 22/03/2018

Autorizzo il trattamento dei miei dati personali presenti nel cv ai sensi del Decreto Legislativo 30 giugno 2003, n. 196 "Codice in materia di protezione dei dati personali" e del GDPR (Regolamento UE 2016/679).

Data: 03/05/2023

Firma

Michele Libralato